



## Sentimental Outlook for the Monetary Policies of South African Reserve Bank

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### Abstract

*The South African Reserve Bank (SARB) migrated to inflation targeting in 2000 and has since embarked on a trajectory of transparency. This has taken the shape of releasing Monetary Policy Committee (MPC) statements other forms of communication. This paper examines SARB's MPC statements' tone and sentiment between 2000 and 2021 using the Besigye-Segawa's TextBlob polarity and subjectivity calculator which measures central bank communication tone and sentiment using the Loughran-McDonald dictionary's word classification to gauge polarity and subjectivity. The study goes on to explore causality of SARB's MPC statements' tone and sentiment on inflation expectation results from the Bureau of Economic (BER) results survey. The systematic analysis shows a causality of SARB's MPC statements' tone and sentiment on succeeding BER's inflation expectations results therein justifying the need for effective communication as SARB's MPC communications' polarity and subjectivity ultimately have a causal effect on inflation expectations. therein justifying the need for effective communication. As central bank tone and sentiment studies are only emerging in many emerging and frontier markets, this study lays a foundation for future exploration of effects of central bank communication on the expectations channel.*

**Keywords:** South African Reserve Bank; Central Bank communication; tone and sentiment; Monetary Policy Committee statements

**JEL Classifications:** E52; E58

## Introduction

In the past decade, effective communication<sup>\*</sup> has emerged as a vital facet in the execution of modern monetary policy (Reid, 2011). More so, as central banks have had to deal with financial crises, their communication with the outside world has evolved considerably over the years (Cœuré, 2017).

Although many central banks in the developed world communicated leading up to the global financial crisis, there have been undeniable leaps in enhancing communication frameworks post the global financial crisis. Siklos' (2013) study of forty central banks to establish changes in communication approaches from 2007 found that firstly, the public disclosure gap between inflation targeters and non-inflation targeters had significantly diminished since 2007 with transparency<sup>†</sup> soaring worldwide<sup>‡</sup>. Siklos (2018) later surveyed the U.S. Federal Reserve, the Bank of Canada, the Reserve Bank of Australia, the Reserve Bank of New Zealand and the Bank of England's language, exploring changes since 2003 in their communication stance around financial stability, uncertainty and their respective economic outlooks. The study concluded that all the sampled central banks had embarked on a trajectory of "greater awareness"<sup>§</sup> towards the need to inform the public on the health of the financial system with particular signals conveyed on the relative uncertain economic outlook. Despite this, Siklos (2018) concludes that comparatively less effort was dedicated to communicating the bearing of monetary policy let alone the diction and phraseology about economic conditions in MPC statements.

Moving from a position of relative opacity<sup>\*\*</sup> three decades ago, today, central banks pride themselves in sharing timely and clear macroeconomic information in a bid to contain expectations. This timely dissemination of information has consequently yielded monetary policy transparency which is not only an essential accompaniment to central bank independence but more pressingly, fosters accountability and safeguards the democratic acceptability of an independent central bank (Geraats, 2002).

Today, transparency and effective central bank communication has become the norm with inflation targeters combining fundamentals of both 'discretion' and 'rules' to achieve their set target in an inflation targeting framework but conscious of both a precise numerical target for inflation and a reaction function in the short term (King, 2005).

Table 1 illustrates different countries' inflation targets and target horizon bearing in mind that the target horizon hinges upon whether inflation is contained in the set price stability range.

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\* De Haan, Eijffinger, & Rybinski, K. (2007) advance that effective central bank communication concerns the dissemination of information by a central bank to the public inline with their monetary objectives. This varies from their economic outlook, their future strategies and overall policy decisions during both certain and uncertain times. To this end, well-communicated information fosters more efficient markets as it bolsters certainty while and dimming volatility, ultimately aiding monetary authorities to realised their already established monetary objectives (Kahn 2007).

† Poole (2003) describes transparency as "accurately conveying accurate information including all the information market participants need to form opinions on monetary policy that are as complete as possible".

‡ Siklos (2013) reports that whether or not crisis conditions are prevalent, it is critical for central banks not to surprise markets.

§ Siklos (2018) study examined various aspects of central bank communication, such as the different avenues used to communicate with particular focus on the frequency of communication with the public. Furthermore, the study also explores finer details such as publication of macroeconomic forecasts and how these are explained to the public. Finally, the study launches an inquiry into whether the crisis shifted the public's attitude towards monetary policy.

\*\* Geraats (2002) contrasts central bank transparency and opacity noting that the former concerns a clear appreciation for symmetric information while absence of transparency (opacity) alludes to asymmetric information. In essence, although the same asymmetric information yields uncertainty, it should be noted that transparency is not necessarily tantamount to all out certainty ergo perfect information.

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**Table 1: Summary Statistics by Country**  
Monetary Policy Frameworks

Country	Inflation Targeting			Central Bank Independence	Central Bank Transparency			
	N	Mean	Adoption date	Mean	Mean	S.D.	25th %	75th %
Argentina	170	0.11	Jan-16	0.60	4.93	0.88	3.50	5.50
Armenia	119	1.00	-	0.76	8.17	0.47	7.50	8.50
Azerbaijan	124	0.00	-	0.38	4.50	-	4.50	4.50
Bangladesh	76	0.00	-	0.33	3.50	-	3.50	3.50
Bolivia	126	0.00	-	0.51	-	-	-	-
Brazil	169	1.00	Jun-99	0.21	5.75	1.03	4.50	6.00
Bulgaria	172	0.00	-	0.76	5.65	0.57	5.50	6.50
Chile	170	1.00	Sep-99	0.64	7.02	0.50	6.50	7.50
China	170	0.00	-	0.37	3.15	0.23	3.00	3.50
Colombia	138	1.00	Oct-99	0.48	7.06	1.22	5.50	8.00
Costa Rica	170	0.00	-	0.58	-	-	-	-
Croatia	168	0.00	-	0.68	3.22	0.25	3.00	3.50
Dominican Republic	120	0.54	Jan-12	0.64	-	-	-	-
Ecuador	112	0.00	-	0.78	-	-	-	-
Egypt	155	0.00	-	0.49	3.26	0.59	3.50	3.50
Guatemala	101	1.00	Jan-05	0.71	3.83	2.23	2.00	7.00
Honduras	101	0.00	-	0.49	-	-	-	-
Hungary	170	1.00	Jun-01	0.50	12.28	1.68	11.00	13.50
India	169	0.07	Aug-16	0.30	2.91	0.64	3.00	3.00
Indonesia	170	0.85	Jul-05	0.46	8.55	0.51	8.50	9.00
Kazakhstan	170	0.18	Aug-15	0.46	5.66	0.86	6.00	6.00
Macedonia	122	0.00	-	0.65	-	-	-	-
Malaysia	170	0.00	-	0.41	6.00	-	6.00	6.00
Mexico	170	1.00	Jan-01	0.49	5.95	0.22	6.00	6.00
Pakistan	168	0.00	-	0.27	4.16	0.78	4.00	4.50
Paraguay	166	0.43	May-11	0.48	-	-	-	-
Peru	169	1.00	Jan-02	0.61	8.02	0.50	7.50	8.50
Philippines	167	1.00	Jan-02	0.52	9.74	0.44	9.00	10.00
Poland	170	1.00	Jan-98	0.46	9.22	1.25	9.00	10.50
Romania	167	0.89	Aug-05	0.45	7.26	0.67	7.50	7.50
Russia	170	0.25	-	0.58	4.00	1.59	3.00	6.00
South Africa	170	1.00	Feb-00	0.29	9.00	-	9.00	9.00
Serbia	112	0.84	-	0.58	4.00	1.59	3.00	6.00
Sri Lanka	85	0.00	-	0.59	5.50	-	5.50	5.50
Taiwan	171	0.00	-	0.19	-	-	-	-
Thailand	170	1.00	May-00	0.16	7.41	0.87	6.50	8.50
Turkey	170	0.82	Jan-06	0.60	9.67	0.63	10.00	10.00
Ukraine	133	0.14	Mar-16	0.62	4.20	0.46	4.00	4.00
Uruguay	170	0.00	-	0.36	3.42	1.51	2.00	5.00
Vietnam	170	0.00	-	0.15	-	-	-	-

Source: Marques, Gelos, Harjes, Sahay, & Xue. (2021)<sup>††</sup>

## Central Bank Communication: A theory

Another way to approach the theoretical relevance of central bank communication is through its influence on the future path of interest rates. As aforementioned, it is widely accepted (Blinder et al, 2008) that a central bank's ability to impact an economy depends on its capacity to shape the agents' expectations on future overnight interest rates. This is the case as few economic decisions depend on the overnight bank rate as longer-term assets' interest rates should signal the path for future overnight rates. Take an example, if the n-day rate is:

$$R_t = \alpha_n + (1/n) (r_t + r_{t+1}^e + r_{t+2}^e + \dots + r_{t+n-1}^e) + \varepsilon_{1t} \quad (1)$$

In essence,  $r_t$  would be the current overnight rate and  $r_{t+1}^e$  is the present expected path of tomorrow's overnight rate while  $\alpha_n$  is the term premium, and the error term indicates that the term premium might be stochastic, then equation (1) illustrates the reliance of intermediate and long-term rates on the public's expectations of future central bank policy (see Blinder et al., 2008).

With this logic, assuming that  $E_t^{PS} \rho_{t+1}$  is the private sector's forecast of next year's inflation. Typically (and practically) this would be based on their information set at a time t, that is  $I_t$ , denoted as  $(E_t^{PS} | I_t) \rho_{t+1}$ . The central bank itself has its own information set  $W_t$  but we assume that the central bank is aware of the private

<sup>††</sup> Table 1 illustrates the Garriga (2016) index of central bank independence, and Dincer & Eichengreen's (2014) index of central bank transparency with the standard deviation abbreviated as S. D. 25 percent and 75 percent are the 25th and 75th percentiles, respectively.

sector's information, that is,  $I_t \in W_t$  however, the reverse is not true, i.e.,  $W_t \notin I_t$ . To this end, there is scope for the central bank to expand the private sector's information set, via announcements, press conferences, inflation reports, MPC statements among others (communication).

Here if successful and effective,  $W_t \in I_t$  after the announcement. With this logic, the argument then turns towards who possesses what information exactly and when they do. So, assuming the central bank's inflation forecast is  $(E_t^{CB}|W_t)\rho_{t+1}$ . Now, here we may find that the central bank's forecast (assuming it is published) influences the private sector forecast (even without revealing what  $W_t$  contains).

This can be represented as:

$$(E_t^{PS}|I_t)\rho_{t+1} = f\left((E_t^{CB}|W_t)\rho_{t+1}\right) \quad (2)$$

Where,  $f$  stands for function. If the above holds true it may be the case that  $(E_t^{CB}|W_t)\rho_{t+1}$  'Granger causes'  $(E_t^{PS}|I_t)\rho_{t+1}$ .

Despite the advances in the empirical literature about central bank communication there remains divergence between some researchers as one school of thought believes effective communication  $W_t \in I_t$  from a central bank is effective only when there is a noticeable movement in financial markets (Born, Ehrmann & Fratzscher, 2014; Lehtimäki & Palmu, 2018). Needless to say, that this is not necessarily always the case.

Another school believes communication is only effective when private sector agents react to the central bank communication. In the context of equation (2), this could mean  $I_t = f(W_t)$  however, the private sector reaction's to central bank communications does not necessarily actuate a movement in financial markets or asset prices for that matter.

Hayo and Neuenkirch (2014) explored how the U.S Fed and Bank of Canada's central bank communications affected financial markets concluding that target rate changes in conjunction with communication enhanced correlations to the Canadian stocks, bonds as well as U.S financial markets. It should be noted that Hayo and Neuenkirch (2014) was indeed far reaching as it contrasted these market participants' perceptions on the respective central bank's credibility and independence looking at more than 550 financial market participants. In their more recent work, Reid and Siklos (2020) advanced that following the financial crisis monetary policy evolved as central bank communication transcended from a mere accompaniment to an alternative monetary policy action. For purposes of this work, the researcher relies on the latter school which believes effective central bank communication is achieved when private sector players react to the communication given. This study examines whether SARB's tone and sentiment in its communication Granger causes inflation expectations of private sector agents.

Theoretically, the essence of central bank communication is to anchor long-term inflation expectations ex ante and ultimately reinforce accountability ex post (Leiderman and Svensson, 1995; Svensson, 1997; Bernanke and Mishkin, 1997; Binder, 2017). Consequently, well-anchored expectations would facilitate inflation stabilisation. This has a caveat however, as it only holds true if expectations affect inflation via for example wage-setting. However, assuming expectations affect inflation via wage-setting but wages are set above the central bank's inflation target, then it would not apply.

In South Africa literature is emerging examining the SARB's overall communication, with some going as far as looking at macroeconomic variables' movements in reaction to SARB's monetary communications. For instance, the earlier work of Reid and Du Plessis (2010) on the SARB, asserts SARB's MPC statements as negative, neutral or positive; ultimately building a SARB inclination backed by the date SARB shares at the time.

Reid et al., (2014) went on to examine how South African newspapers cover SARB policy actions. It should be noted that this study is analogous to Berger et al., (2011), with the later focusing on the ECB. Reid et al.,

(2014: 8) expose how the inattentive public relies on the media  $I_t^{IN} \in I_t^{MED} \in W_t$  to “gather, condense and interpret this primary information on their behalf”  $E_t^{IPS}(I_t | \rho_{t+1}) = E_t^{MED}(M_t | \rho_{t+1})$ .

## South Africa: An Overview

The SARB migrated to inflation targeting in February 2000 as noted by Mboweni (2004:2), who conveys:

“With the adoption of this framework, the Bank moved away from an eclectic monetary policy framework or informal inflation targeting. In the eclectic monetary policy framework, the growth in the money supply and bank credit extension were used as intermediate guidelines for the determination of short-term interest rates. In addition, in deciding on the most appropriate monetary policy stance, developments in a number of other variables were also taken into consideration, because the monetary aggregates had lost some of their usefulness as indicators of future inflation due to structural changes in the economy”. Mboweni (2004:2).

Mishkin (2001:1) further augments noting, “inflation targeting encompasses five main elements: the public announcement of medium-term numerical targets for inflation, an institutional commitment to price stability as the primary goal of monetary policy, an information-inclusive strategy in which many variables, and not just monetary aggregates or the exchange rate, are used for deciding the setting of policy instruments. Increased transparency of the monetary-policy strategy through communication with the public and the markets about the plans, objectives and decisions of the monetary authorities and increased accountability of the central bank for attaining its inflation objectives”. In addition to Mishkin’s submission, an inflation targeting framework encompasses the reaction function which concerns how (optimal) the repo responds to deviations of inflation from the inflation target and the output gap.

For the case of South Africa, however, the monetary policy framework of the SARB encompasses an inflation target (3 percent —6 percent) that is set by the government, and the inaugural announcement of this target was first announced by the nation’s Finance Minister in February 2000. At the time inflation was hovering at about 7% (Mnyande, 2008). Consequently, a more pressing issue that surfaced was whether the SARB would announce its target on an annual basis or embark on a more long-sighted avenue, which would mean clearly sharing its multi-year path (Mnyande, 2008).

At the time SARB decided on a path that would see its MPC embark on a more near-term approach which would only share annual targets and not shed light on the disinflation outlook. It should be noted that this was a quick fix to the inflation at the moment, and the annual approach would accord policy makers relatively more flexibility in their monetary policy recalibration.

It is important to note that much has changed in the 20 years since SARB’s migration to inflation targeting, as monetary authority works hand in hand with the fiscal body in a joint National Treasury/SARB Inflation Targeting Technical Committee. A standout trait of the taskforce is the composition, which simultaneously serves as an advisory body to both the SARB Governor and the Minister of Finance.

## Methodology: Appraising ‘SARB-Speak’

This section will explore the method to be used to extract data from the MPC transcripts. This study will explore SARB’s MPC communications from November 2000 to January 2021; applying the Besigye-Segawa’s TextBlob polarity and subjectivity calculator to the MPC statements.

It should be noted that there are two text sentiment mining methods recognised by central bank scholars. This study chose to solely rely on the dictionary method at the expense of the Boolean technique which relies mainly on internet cache as it is already embedded in search engines for text analysis. This makes the analysis much simpler as Bholat, Hansen, Santos, & Schonhardt-Bailey (2015: 7) exposes:

“Since Boolean search is incorporated in most major internet search engines, one advantage of this technique is that researchers do not have to have access to the raw texts if they already have been indexed,” Bholat et al., (2015: 7).

It is stressed that the researcher will not use the Boolean technique given that it best gauges 'naturalistic language' tone, yet central banking is best analysed with the Loughran-McDonald dictionary<sup>††</sup> due to the fact it measures the intensity of word use. In addition, since Boolean searches are incorporated in most major internet search engines, the study would lack rigour given the differing tone and sentiment of 'naturalistic language' from 'economic language'. Loughran and McDonald (2011:3) address this noting that:

"Almost three-fourths of the words identified as negative by the widely used Harvard Dictionary are words typically not considered negative in financial contexts."

This informs the choice of the dictionary technique as the study relies on Loughran and McDonald's (2011) dictionary which is specifically compiled to gauge central bank texts. This study relies on Loughran and McDonald's (2011) dictionary as the backend to create a sentiment and tone calculator. However, because Loughran and McDonald's (2011) dictionary is often deemed as obsessively negative (see Sardelich and Kazakov (2018), the Besigye-Segawa TextBlob Sentiment Calculator was also embedded with a naturalistic lexicon (which is a dictionary with natural language) to counter this shortcoming. Despite numerous sentiment measurements methods emerging in the past fifteen years, such as Apel & Grimaldi (2012), which was criticised for its inability to appreciate the "forward-looking content of the ECB introductory statement" by Picault & Renault (2017), this study relies on the relatively widely accepted Loughran and McDonald (2011) method.

## Sentiment Analysis using Dictionary Technique

Central bank communication requires utter consistency as conveyed by Jansen & De Haan (2011:2):

"An important requirement for communication to be effective is consistency. If central bankers too frequently change their vocabulary, it will be difficult for observers to properly infer the message that central bankers are trying to convey".

Although this rationale for central bank communication consistency is valid, there needs to be a window for vocabulary adjustment in dictionaries during 'uncertain times' such as the global financial crisis which saw the emergence of quantitative easing.

An emergent body of economics research has grown to adopt textual and sentiment analysis to unpack the sentiment and tone of financial and economic documents in addition to other official releases. It should be noted that 10-K reports are annual firm operational reports filed with the US Securities and Exchange Commission, and are renowned for being more detailed than annual report sent to stockholders. The detail includes financial data management compensation and legal proceedings.

The past two decades have seen the work of Li (2008); Engelberg (2008); Antweiler & Frank (2004); Tetlock (2007), emerge with ground-breaking studies on textual analysis. With regards to central banking, however, Loughran & McDonald (2011) work on textual analysis, dictionaries and 10-K documents is still the gold standard as they compiled 80,000 words into their dictionary which specially have relevance to central bank communications.

Loughran & McDonald (2015:1) submit:

"About 83% of the Diction optimistic words and 70% of the Diction pessimistic words appearing in a large 10-K sample are likely misclassified. Frequently occurring Diction optimistic words like respect, security, power, and authority will not be considered positive by readers of business documents. Similarly, over 45% of the Diction pessimistic 10-K word-counts are not and no. The Loughran-McDonald (2011) dictionary appears better at capturing tone in business text than Diction".

As mentioned earlier, the dictionary technique of choice will rely on the Loughran-McDonald dictionary as the back-end lexicon to gauge subjectivity and polarity.

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<sup>††</sup> Given the vastness of the Loughran and McDonald dictionary, the study does not list the words comprised in the lexicon but it is available at: <https://sraf.nd.edu/textual-analysis/resources/#LM%20Sentiment%20Word%20Lists>

Loughran & McDonald (2011) pioneered their Loughran-McDonald dictionary which built on the flaws of the much popular Harvard IV-4 dictionary to make a more 10-K relevant dictionary.

Unlike the Boolean techniques, dictionary techniques go a step further and can measure the concentration of word use. This is one of the defining features which inform the researcher's choice for using the dictionary technique at the expense of Boolean techniques. Furthermore, given that forward guidance and economic outlook in central banking tones are often emphasized in central bank communications, using a technique which measures word intensity adds gravitas to the study.

In addition, it is always preferable to use dictionary techniques when a researcher has the raw data, as is the case for this study (Bholat et al., 2015). The researcher has all the SARB MPC transcripts, further informing the choice for this methodological approach.

### Text mining methodology

The initial step is turning the MPC transcript text into data which is readable by the 'Besigye-Segawa's TextBlob polarity and subjectivity calculator. As expounded by Luangaram & Wongwachara (2017), it is essential to eliminate common words from the MPC statements such as 'a', 'an', 'the', 'of' and many more. This is done by adding stop words that would be used as reference for the exclusion of non-informative text in the processing. Stop words are words that are classified as being distracting to the NLP algorithm, and cuts down on the render time thereby improving model accuracy.

The next step is topic modelling, which is a thematic approach to data quantification that enables the researcher to analyse patterns in the data and easily pick up on themes. Categorisation assists in the data processing too as specific words are used often in relation to growth while others are particular to price stability discussions.

Running the SARB monetary policy statements through the Besigye-Segawa's TextBlob polarity and subjectivity calculator code, the document's contents are then contrasted with the Loughran and McDonald dictionary irrespective of any repetition, language syntax or location in the PDF document. Through the thematic analysis tool, the Besigye-Segawa's TextBlob polarity and subjectivity calculator can also pick up on themes such as word clusters which appear at specific locations of the MPC statements in addition to positivity, negativity, objectivity and subjectivity.

This paper relies on 'Python code' first advanced by Chen (2015; 2016), but applies the Loughran and McDonald dictionary to the database to come up with text mining model. The more sophisticated approach to using machine learning for text interpretation is the application of the human cognitive element that seeks to distinguish between facts and opinions, as represented in the Besigye-Segawa's TextBlob.

### Besigye-Segawa's TextBlob polarity and subjectivity calculator: Calculating Polarity and Subjectivity

The TextBlob library for Python seamlessly allows for symbolic and statistical Natural Language Processing (NLP) tasks. This study will rely on natural language sentiment analysis (which measures polarity and subjectivity) in addition to the Loughran-McDonald dictionary powered Chen (2015; 2016) programme which looks at positivity and negativity of MPC communications. This methodological path is motivated by the earlier noted delimit of the Loughran-McDonald dictionary as it often struggles to process 'naturalistic language' as eminently submitted by Cannon (2015)<sup>§§</sup>.

The Besigye-Segawa TextBlob calculator, for example, can gauge the polarity and subjectivity in a naturalistic sentence in the example (code) below:

```
"TextBlob ('not a very great calculation').sentiment
##Sentiment (polarity=-0.3076923076923077, subjectivity=0.5769230769230769)"
```

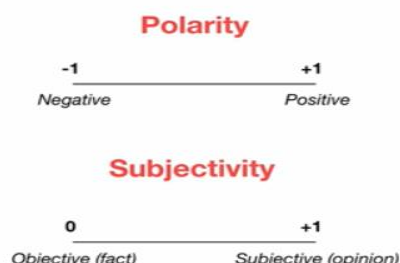
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<sup>§§</sup> Cannon (2015) noted in her study on the effects of Federal Open Market Committee's (FOMC) sentiment on economic activity that the Loughran-McDonald dictionary neglected some subtlety of the speech patterns in the FOMC transcripts, but nonetheless, she concluded that it remains the best option for financial text tone and sentiment analysis.

The result illustrates a polarity of 0.307 and subjectivity of 0.576 which translates in it is slightly negative but contrastingly, its subjectivity which registers at about 0.6 means it is fairly subjective.

It should be noted that the subjectivity and polarity sentiment calculation is computed in `_text.py` code ('Python' code). In other words, the text to be analysed must be converted to a 'Python' friendly file format. Thereafter, add Loughran-McDonald dictionary and run the text through the software. To this end:

```
"# 1) Polarity: negative vs. positive (-1.0 => +1.0)
# 2) Subjectivity: objective vs. subjective (+0.0 => +1.0)"
```



**Figure 1:** Illustration of Polarity and Subjectivity

The Besigye-Segawa's TextBlob polarity and subjectivity calculator also handles modifier words such as 'very', which can easily change the meaning of the preceding word. To this end, recognizing 'very' as a modifier word, the Besigye-Segawa's TextBlob polarity and subjectivity calculator will these modifier words in question and skip over to the subsequent word.

Meanwhile, the Besigye-Segawa's TextBlob polarity and subjectivity calculator also ignores one-letter words in its sentiment phrases. For example:

```
"TextBlob('not a very great').sentiment
##Sentiment(polarity=-0.3076923076923077, subjectivity=0.5769230769230769)"
```

Since the original TextBlob ignore words it doesn't know anything about, the Besigye-Segawa's TextBlob polarity and subjectivity calculator was modified by using the Treebank tokenizer that uses regular expressions to tokenize text. Simply put, the library breaks down text into linguistic units that are in the simplest language form. The benefits of using NLP are that a piece of text gets deconstructed into its simplest form before being reconstructed into a basic sentence without losing the meaning of the text.

## Data Sources

SARB's Governors' speeches are the primary data source and are publicly available on SARB's website. They can be directly downloaded from the SARB website: <https://www.resbank.co.za/en/home/publications/statements>. This tally makes up speeches from January 2000 to January 2021. These are converted from PDF to text files and then deconstructed to generate individual text files.

After converting the files to text format, these text files are 'cleaned' more by ridding them of stop words and 'whitespaces'\*\*\*. Using the approach described in the methodology section, the researcher tallies the negative and positive words for each MPC statement.

It should be noted that this study is an independent exploration and has been conducted with publicly available information without access to unpublished minutes of MPC meetings.

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\*\*\* White space can be defined as unused space around an object. To this end, these white spaces aid in assorting paragraphs of text and other portions of a document.



The study also relies on the Bureau for Economic Research's (BER) inflation expectations survey to examine the potential causality to SARB's tone and sentiment. The reasoning here is to examine causality of SARB's tone and sentiment on subsequent BER inflation expectations as the study looks at the BER inflation expectations dataset ex post the SARB MPC statements and not ex ante. For instance, if the SARB released their MPC on 11th December 2008, the study would then examine for causality with BER's inflation expectations for the first quarter of 2009.

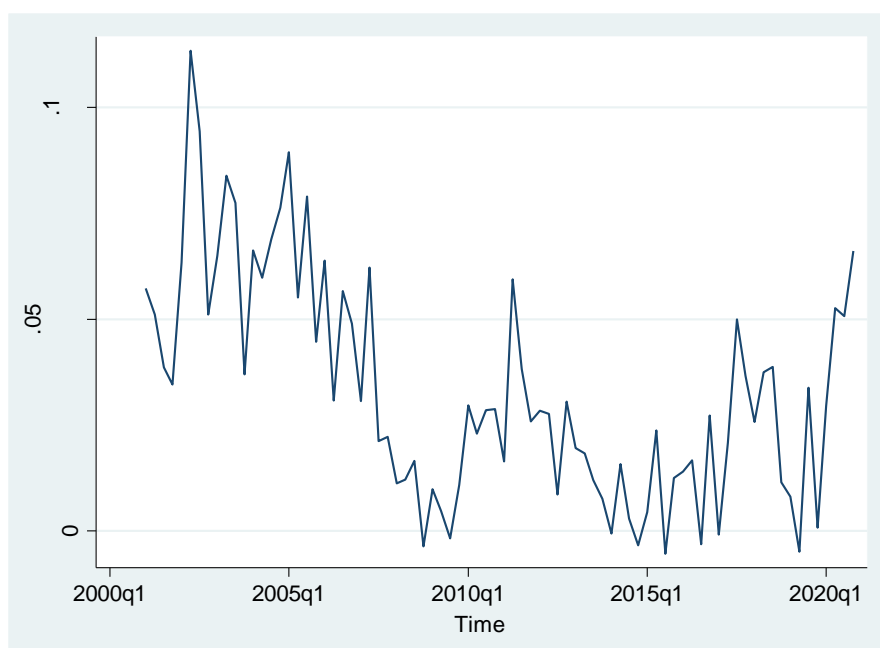
BER's inflation expectations survey is in line with SARB's inflation targeting framework and has conducted quarterly inflation expectation assessments among a wide range of market participants from financial analysts, business people, trade union officials to households (Bureau for Economic Research, 2021). Because BER's inflation expectations results are readily available to the public on their online portal, the study contrasts SARB's tone and sentiment in their MPC statement with BER's inflation expectations survey from 2001 to 2021 offering a twenty-year dataset. The breadth of the data therein allows for an extensive inquiry into causality.

Since BER's inflation expectation survey results are provided on a quarterly timetable, the study is able to adequately explore causality in SARB's tone and sentiment to BER's inflation expectations results. In addition, although BER's inflation expectations survey also covers the market participants' outlooks and forecasts for other macroeconomic variables such as wage hikes, foreign exchange movements and aggregate economic growth this study only focuses on the overall inflation outlook as reported in the survey.

The study relies on BER's average inflation expectations and not a particular group. This is informed by Kabundi et al. (2015) who studied the connection between inflation expectations of different market agents and inflation in South Africa from 2000 to 2013. The study concluded that inflation expectations of South African businesses and unions were closely linked to each other and were relatively higher than the upper bound of the official SARB target band while analysts' expectations were within the target band. With these findings, using the average BER inflation expectations would counter this bias from any of the economic agents namely: analysts, business, and trade unions.

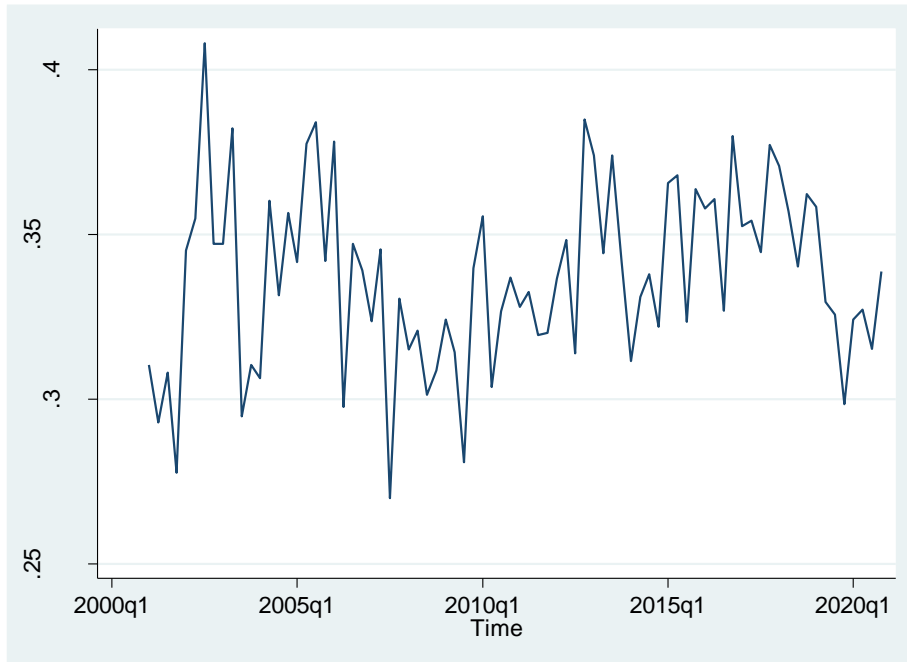
As earlier highlighted, this study relies on public SARB MPC statement data which is readily available on their website. The data studied is from from January 2001 to January 2021. The first set of results is generated comes from the sentiment analysis of SARB's MPC transcripts from January 2000 to January 2021.

## Results



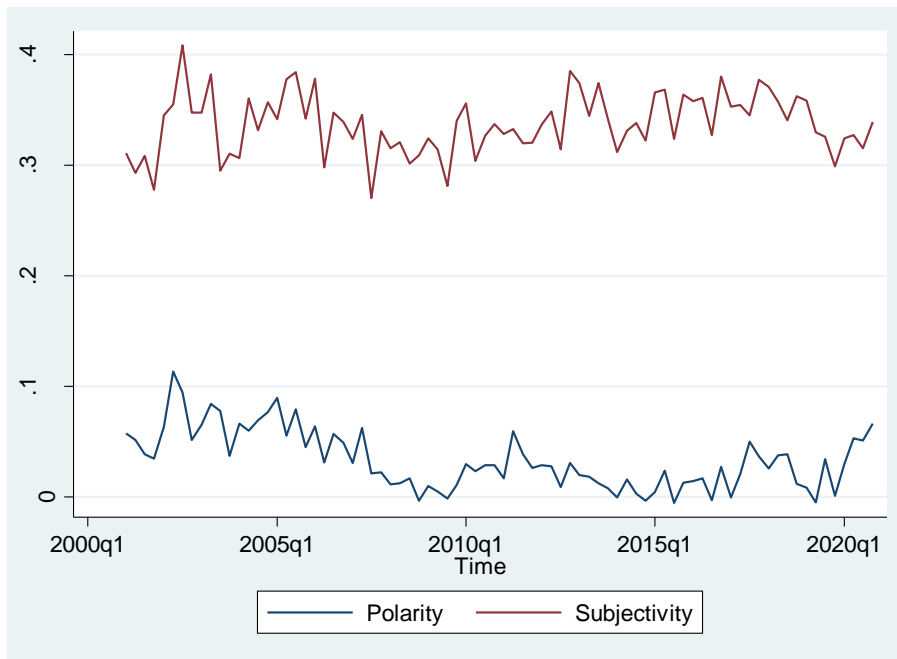
**Figure 2:** Computation showing SARB MPC statements' Polarity

Running the SARB MPC statements through the Besigye-Segawa's TextBlob polarity and subjectivity calculator, a computation was generated revealing a sudden downward trend in 2008, and in 2011 there is another downward trend observed. As noted earlier, the higher polarity would signal more positive words in the SARB MPC statements and a lower polarity signalling more negative words or tone. The trend lower polarity in the SARB MPC statement dated 28<sup>th</sup> May 2009 reads at -0.0104589329589329, and this downward trend troughs in the MPC statement dated 13<sup>th</sup> August 2009 reading at -0.0144406365239698.



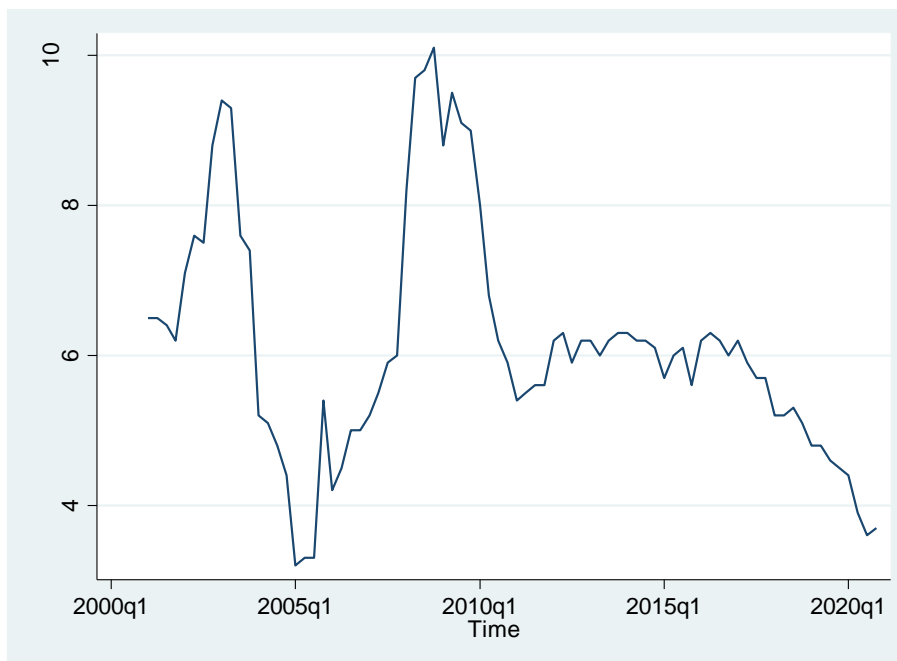
**Figure 3:** Computation showing SARB MPC statements' Subjectivity.

On the other hand, the SARB MPC statements between 2001 and 2020 exhibited relatively more objectivity, with over 80% of the statements having traits of fact as opposed to opinion. As was the case for the polarity, the objectivity waivers sharply towards subjectivity in 2008 which is in line with the global financial crisis. To reiterate, a higher subjectivity reveals that the MPC statement is leaning towards opinion while a lower subjectivity connotes objectivity. With this logic, the global financial crisis ushered in more communication and ultimately the acceptance of the forward guidance era as many central banks had arrived at their effective lower bound.

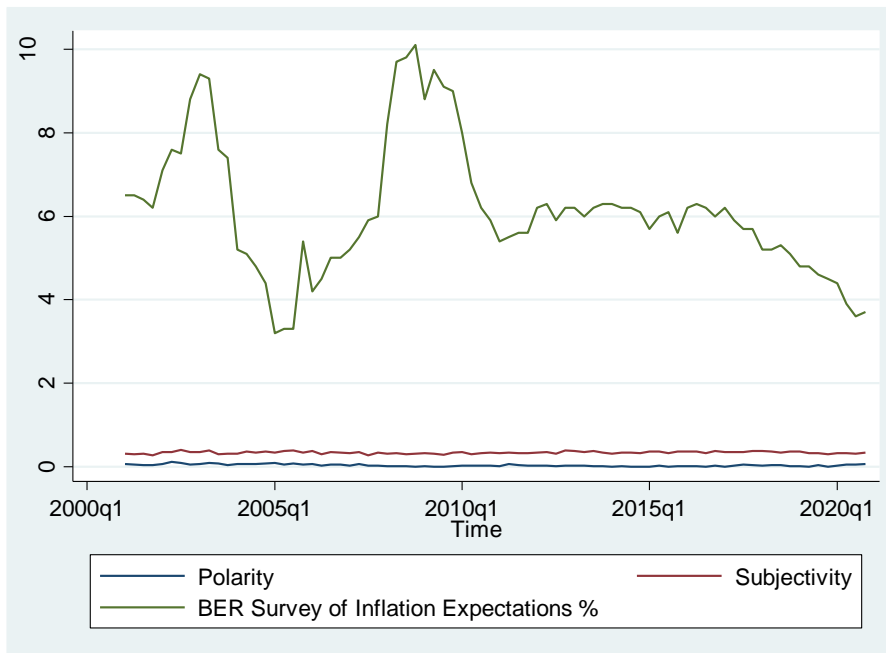


**Figure 4:** Computation showing SARB MPC statements' Subjectivity and Polarity

Contrasting both the polarity and the subjectivity figures presents a premise that higher polarity is accompanied by higher subjectivity in the statements. In other words, higher positivity ushers in more opinion in the central bank's communications. This is observed in many of the statements such as the SARB MPC statement dated 13<sup>th</sup> June 2002 which registers a polarity of 0.113357781 and a subjectivity of 0.35486607, both relatively high.



**Figure 5:** Computation showing BER's inflation expectations survey results



**Figure 6:** Computation showing BER's inflation expectations survey results and SARb MPC statements' Subjectivity and Polarity

The varsoc command was ran to determine the optimal lag.

**Table 2:** Lag selection

. varsoc BERSurveyofInflationExpectat Polarity Subjectivity, maxlag(8)

Selection-order criteria

Sample: 2003q1 - 2020q4 Number of obs = 72

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	198.736				8.7e-07	-5.43711	-5.39934	-5.34224
1	295.2	192.93	9	0.000	7.7e-08	-7.86667	-7.71561	-7.48723*
2	307.806	25.213	9	0.003	7.0e-08	-7.96685	-7.70249	-7.30282
3	326.081	36.55	9	0.000	5.4e-08*	-8.22448*	-7.84684*	-7.27587
4	333.462	14.762	9	0.098	5.7e-08	-8.17951	-7.68857	-6.94631
5	338.62	10.316	9	0.326	6.4e-08	-8.07279	-7.46855	-6.55501
6	344.254	11.267	9	0.258	7.1e-08	-7.97927	-7.26174	-6.17691
7	356.988	25.469*	9	0.002	6.6e-08	-8.083	-7.25218	-5.99605
8	359.043	4.1097	9	0.904	8.2e-08	-7.89008	-6.94597	-5.51855

Endogenous: BERSurveyofInflationExpectat Polarity Subjectivity

Exogenous: \_cons

Three of the five criteria selected 3 lags, one suggested 1 lag while another method selected 7 lags. Thus, since majority indicated 3 lags, further analysis was done using 3 lags.

The study relied on the assumption that the variables are non-stationary at level but they are converted to bridge the difference ergo they must be stationary.

The null hypotheses at rank zero were;

HO: There is no co-integration

H1: There is co-integration

The null hypothesis is rejected in favour of the alternative if the trace statistics is more than the 5% critical value. The results are presented below.

**Table 3:** Johansen test for co-integration

. vecrank BERSurveyofInflationExpectat Polarity Subjectivity, trend(constant) lags(3) max

Johansen tests for cointegration					
Trend: constant			Number of obs =		77
Sample: 2001q4 - 2020q4			Lags =		3
maximum				trace	5%
rank	parms	LL	eigenvalue	statistic	critical
0	21	313.39548	.	26.4575*	29.68
1	26	321.61022	0.19214	10.0280	15.41
2	29	325.03763	0.08518	3.1732	3.76
3	30	326.62423	0.04037		
maximum				max	5%
rank	parms	LL	eigenvalue	statistic	critical
0	21	313.39548	.	16.4295	20.97
1	26	321.61022	0.19214	6.8548	14.07
2	29	325.03763	0.08518	3.1732	3.76
3	30	326.62423	0.04037		

At zero. The test statistics was 26.4575, which was less than the 5% critical value of 29.68. This means that the null hypothesis could not be rejected. This implies that the three variables do not have a long run association. This implies that since the long run the variables do not move together, there is simply no correlation.

As a result, the ideal model is Unrestricted VAR since there is no co-integration.

A VAR model was fitted to assess for short run causality. The results are shown below.

**Table 4: VAR model**  
Vector autoregression

Sample: 2001q4 - 2020q4	Number of obs	=	77
Log likelihood = 326.6242	AIC	=	-7.704526
FPE = 9.09e-08	HQIC	=	-7.339265
Det(Sigma_ml) = 4.15e-08	SBIC	=	-6.791355

Equation	Parms	RMSE	R-sq	chi2	P>chi2
Polarity	10	.01795	0.6094	120.134	0.0000
Subjectivity	10	.026759	0.1417	12.71198	0.1761
BERSurveyofInf~t	10	.608335	0.8757	542.3631	0.0000

		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
<b>Polarity</b>							
	Polarity						
	L1.	.5420322	.1259305	4.30	0.000	.295213	.7888514
	L2.	.1632438	.1356612	1.20	0.229	-.1026473	.4291349
	L3.	.1678827	.1195053	1.40	0.160	-.0663433	.4021087
	Subjectivity						
	L1.	-.1217709	.0845409	-1.44	0.150	-.287468	.0439262
	L2.	-.1009054	.0838209	-1.20	0.229	-.2651913	.0633806
	L3.	.0258891	.0836396	0.31	0.757	-.1380415	.1898197
	BERSurveyofInflationExpectat						
	L1.	.0046288	.0031098	1.49	0.137	-.0014664	.0107239
	L2.	-.0118696	.0046943	-2.53	0.011	-.0210702	-.002669
	L3.	.0066964	.0032121	2.08	0.037	.0004008	.0129921
	_cons	.0743043	.03825	1.94	0.052	-.0006644	.149273
<b>Subjectivity</b>							
	Polarity						
	L1.	.0110525	.1877308	0.06	0.953	-.3568931	.3789981
	L2.	.0217281	.2022369	0.11	0.914	-.3746489	.4181051
	L3.	.0064245	.1781524	0.04	0.971	-.3427478	.3555968
	Subjectivity						
	L1.	.1412273	.1260293	1.12	0.262	-.1057856	.3882401
	L2.	.1807534	.124956	1.45	0.148	-.0641558	.4256626
	L3.	.0811774	.1246857	0.65	0.515	-.1632021	.3255569
	BERSurveyofInflationExpectat						
	L1.	.0008446	.004636	0.18	0.855	-.0082417	.009931
	L2.	-.0059656	.006998	-0.85	0.394	-.0196814	.0077503
	L3.	.003024	.0047885	0.63	0.528	-.0063612	.0124092
	_cons	.2139836	.0570212	3.75	0.000	.1022241	.3257431

<b>BERSurveyofInflationExpectat</b>						
Polarity						
L1.	-2.8513	4.267904	-0.67	0.504	-11.21624	5.513637
L2.	-8.978828	4.597688	-1.95	0.051	-17.99013	.0324739
L3.	13.26185	4.050147	3.27	0.001	5.323708	21.19999
Subjectivity						
L1.	1.352935	2.865171	0.47	0.637	-4.262697	6.968567
L2.	2.216172	2.84077	0.78	0.435	-3.351635	7.783979
L3.	-8.531076	2.834626	-3.01	0.003	-14.08684	-2.975311
BERSurveyofInflationExpectat						
L1.	1.052747	.1053951	9.99	0.000	.8461767	1.259318
L2.	.0551154	.1590941	0.35	0.729	-.2567034	.3669341
L3.	-.2467804	.1088619	-2.27	0.023	-.4601458	-.033415
_cons	2.462223	1.296329	1.90	0.058	-.0785365	5.002982

The study found that the Polarity is significantly affected by polarity lag 1 (p-value = 0.000) and BER Survey of Inflation Expectations % lag 2 (p-value = 0.011) and Lag 3 (p-value = 0.037) in the short run.

Subjectivity is significantly affected by polarity lag 1 (p-value = 0.000) and BER Survey of Inflation Expectations % lag 2 (p-value = 0.011) and Lag 3 (p-value = 0.037) in the short run.

BER Survey of Inflation Expectations % is significantly affected by Polarity lag 3 (p-value = 0.001), subjectivity lag 3 (p-value = 0.003), BER Survey of Inflation Expectations % (p-value = 0.000) and BER Survey of Inflation Expectations % lag 3 (p-value = 0.023) in the short run.

**Table 5:** Granger causality in the short run  
. **vargranger**

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
Polarity	Subjectivity	5.0033	3	0.172
Polarity	BERSurveyofInfl~t	7.0348	3	0.071
Polarity	ALL	12.457	6	0.053
Subjectivity	Polarity	.10072	3	0.992
Subjectivity	BERSurveyofInfl~t	2.1151	3	0.549
Subjectivity	ALL	2.4544	6	0.874
BERSurveyofInfl~t	Polarity	10.925	3	0.012
BERSurveyofInfl~t	Subjectivity	9.1941	3	0.027
BERSurveyofInfl~t	ALL	14.779	6	0.022

The results shows that there is short run causality running from SARB's MPC statement subjectivity lags (p-value = 0.012) to succeeding BER Survey of Inflation Expectations and also a short run causality running from subjectivity lags (p-value = 0.027) to Survey of Inflation Expectations.

Therefore, there is a short run causality running from both variables' polarity lags and subjectivity lags (p-value = 0.022) to BER's Survey of Inflation Expectations %.



## Discussions

The findings of this study clearly show that between 2001 and 2021, SARB's MPC statements exhibit a short run causality with BER's inflation expectations survey reaffirming the rationale for transparency and clarity in central bank communications given the impact on the 'expectations channel' as prescribed by Svensson (1999). As determined by Svensson (1999), monetary policy transmission in the expectations channel is greatly dependent on anticipated future inflation, the expected future output gap, and the expected future real exchange rate. Relying on this proposition then, SARB's ability, or lack of for that matter, to achieve its monetary policy transmission effortlessly and ultimately its goals (away from open market operations) are inherently reliant on the ability to effectively communicate. As evidenced by the fore-proven empirical short run causality for both SARB Polarity and subjectivity to BER's inflation expectations survey.

### Shock, Polarity: Inflation

The results reveal snap movements in SARB's polarity especially related to economic shocks; an example is the SARB MPC statements through 2008 in 2010 which clearly exhibit negativity in SARB's tone. As this was during the global economic crisis a grim economic outlook was expected. In the SARB MPC dated 11<sup>th</sup> December 2008, the opening paragraph read:

"Since the previous meeting of the Monetary Policy Committee, domestic inflation has moderated and is expected to decline further over the coming months. At the same time, the South African economy has been affected by the significant global slowdown that has intensified recently. The domestic economy experienced negligible growth in the third quarter, while a number of sectors contracted".

This particular MPC statement recorded one of the few negative polarity scores at -0.00367090671885191. As the results reveal a causality between SARB's tone and sentiment and BER's inflation expectations, this is out rightly reflected on the BER inflation expectations results which registered at 10.1% for the 2008 fourth quarter reading.

### SARB sentiment soothes 'unconventional times'

SARB's sentiment and tone, just like any other central bank, is highly influenced by the business cycle. At times of heightened economic distress there tends to be more information shared by the Reserve Bank. However, keen focus is paid to communication during 'unconventional times' as coined by Reid, Siklos, Guetterman & Du Plessis (2020). In their study, they refer to 'unconventional times' as a period in the economy where monetary policy becomes ineffective and conclude that during the 'unconventional times' communication acts as a vital monetary tool, and in some extreme cases even acting as a substitute for more conventional monetary policy. Evaluating SARB sentiment data, there is a clear spike in subjectivity during 'unconventional times'. One of the spikes is evident in the SARB MPC statement issued on 19<sup>th</sup> November 2020 at the height of South Africa's COVID-19 pandemic. This statement scores 0.3388155874858 on the subjectivity index, which the score indicates more opinion than fact. It alludes to SARB's efforts to calm the market through reassurance during 'unconventional times'.

Another example is cited in 2002 when SARB announced in their MPC statement that inflation was on its path to double figures. The statement issued on 12<sup>th</sup> September 2002 read:

"The year-on-year increase in the consumer price index for metropolitan and other urban areas, excluding the influence of mortgage interest cost (CPIX), increased from 5,8 per cent in September 2001 to 9,9 per cent in July 2002. The acceleration in the quarter-to-quarter CPIX inflation rate was even more pronounced from an annualised rate of only 3,8 per cent in the second quarter of 2001 to 11,5 per cent in the second quarter of 2002. The twelve-month rate of increase in the all-goods production price index also rose from 7,8 per cent in September 2001 to the high level of 15,2 per cent in July 2002".

The inflationary pressure coupled with soaring oil prices left the SARB sounding a grim tone noting that, "This requires a concerted effort by all concerned". As this too counts for an 'unconventional time' as designated by Coenen et al., (2017), it came as no surprise that SARB's sentiment reading for this particular MPC statement dated 12<sup>th</sup> September 2002 scored a steep 0.408046218487394. As aforementioned, often during 'unconventional times', communication acts as a critical monetary tool and may even become a substitute for more conventional monetary policy (Coenen et al., 2017; Reid et al., 2019). The high subjectivity score of



this MPC statement affirms this premise as the soaring inflation, depreciating Rand and rising crude oil prices left the SARB a loss for monetary options hence the reassurance through monetary policy communication.

### **SARB reassurance cushions inflation expectations**

Building on the premise of communication being vital during 'unconventional times,' the study contrasted BER's inflation expectations during these 'unconventional times' when the SARB sought to reassure the market. Although this study has already established a short run causality running from SARB's polarity and subjectivity with a p-value of 0.022) on BER's Survey of inflation expectations, a further inquiry into the BER reading during 'unconventional times' only reasserts the rationale for more SARB communication.

Taking the two examples of the SARB MPC statements issued on 19<sup>th</sup> November 2020 and 12<sup>th</sup> September 2002 during 'unconventional times', a contrast to the BER inflation expectations survey affirms not only the causality but also the effect SARB's subjectivity has on inflation expectations as a whole.

First, for the SARB MPC statements issued on 19<sup>th</sup> November 2020, BER's inflation expectations for the fourth quarter of 2020 registered at 3.7 per cent. As for the SARB MPC statements issued on 12<sup>th</sup> September 2002, inflation expectations for the fourth quarter of 2002 registered at 8.8 per cent which was significantly lower than the actual recorded consumer price index which registered at 9.9 per cent in July 2002.

## **Conclusion**

As inflation expectations in principal drive lead households to spend more before the expected price increases emerge (see Yellen, 2018), it is almost impossible for a central bank to practice inflation targeting without surveying where the market forecasts inflation to stand. To this end, if a central bank's tone and sentiment has causality on inflation expectations then this affirms the need for effective communication in the modern monetary policy era.

As many African central banks have adopted inflation targeting over the past two decades, it has almost become impossible for them to evade their obligation to effectively communicate; especially if they opt for the expectations channel. In the quest for more clarity in communicating however, there has emerged a determined inquisition into what and how central banks communicate and although some literature has emerged on how and what central banks communicate (see Blinder, Goodhart, Hildebrand, Lipton, & Wyplosz, 2001; Blinder & Wyplosz, 2004; Blinder et al., 2008; Bulír, Cihák & Šmídková, 2013b; Bholat et al., 2015; Kahveci & Odabaş, 2016), going further to textually analyse what is communicated is only emerging in the African context.

Given the twenty-year sample size of this study, this paper is able to offer an insight into SARB's tone and sentiment over the past two decades with a novel sentiment and polarity textual analysis which covers for the McDonald and Loughran dictionary naturalistic language shortcomings. The study then went on to empirically prove a short run casualty between SARB's tone and sentiment and BER's inflation expectations therein reaffirming the essence of effective communication in achieving monetary goals in the modern monetary frameworks.

However, there remains a great deal that can be done in the field especially around tone and sentiment analysis. Given the twenty-year span of this particular study, the SARB has had three different Governors and all have had their different traits and styles. This can be another avenue explored in future tone and sentiment studies as has been the case for the United States Fed. For instance, Mehrling, Moss, Pixley, & Tavlas, (2007) who effectively concluded that a central banker's personality is critical towards achieving monetary stability and overall financial leadership. Future studies can contrast the tone and sentiment of the rather vocal and forthright former governor Tito Mboweni and contrast this with the often calm and collected former Governor Gill Marcus.

Another area of future research can be a deeper inquiry into whether SARB's polarity has a stronger causality to BER inflation expectations or is it SARB's sentiment that sways inflation expectations. We leave this to future studies.

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